INTEX-18 Transit flight summary- 11 August, 2004

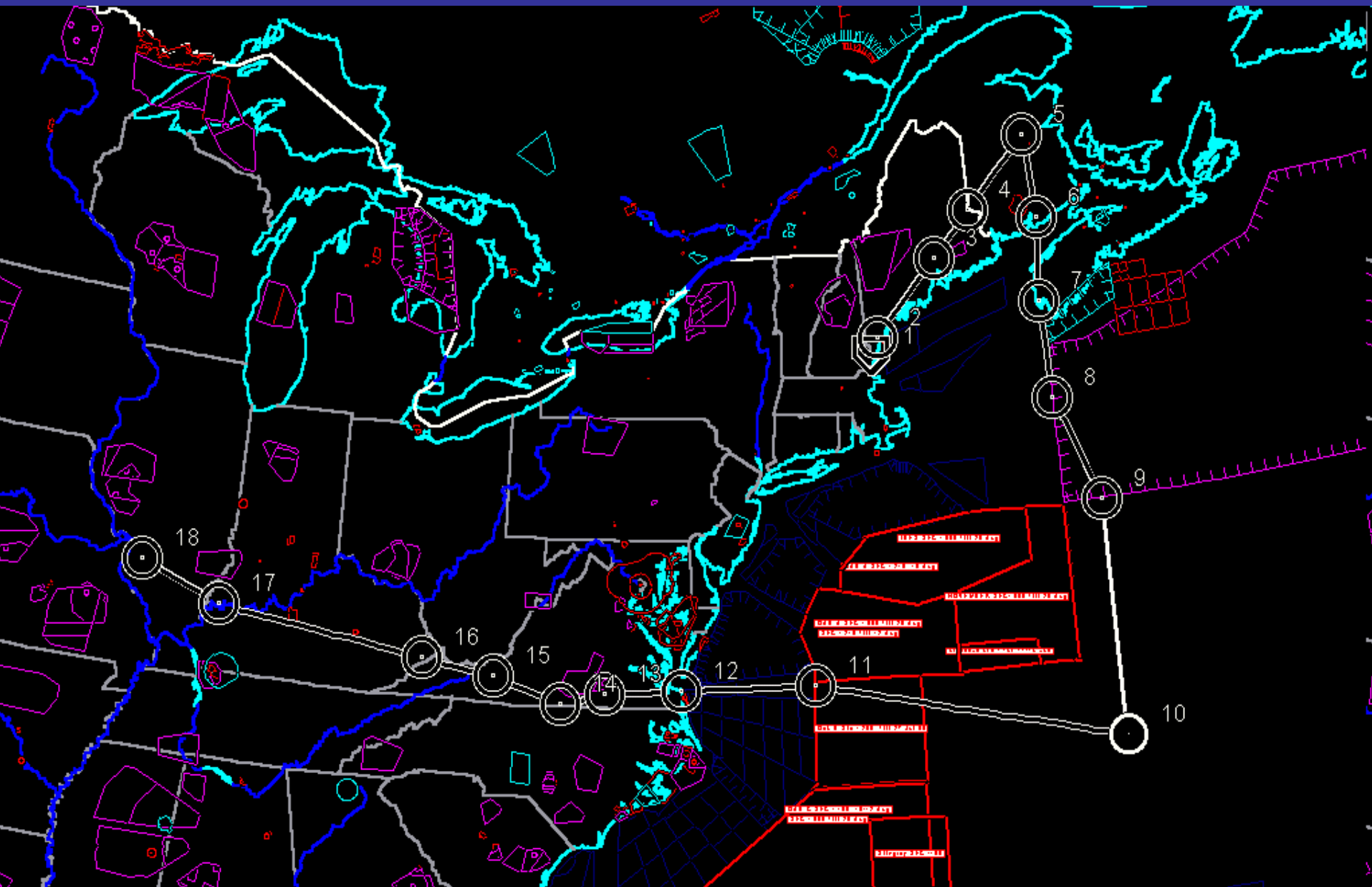
Flight 18 was a transit flight from Pease to MidAmerica with embedded science objectives. The main science goals were to under-fly Terra (MOPITT) and Aqua (AIRS) satellites, to sample North American outflow associated with a warm conveyor belt, and perform extensive surface level sampling over land for purposes of source characterization. Take off time was 1200 UT with a total flight duration of 8.5 hours. The flight plan and flight profile is shown in the attached slides. It was necessary to greatly modify this plan in-flight to accommodate flight restrictions.

A quasi-stationary cold front was the dominant surface feature during the flight. This front extended from a low north of the Great Lakes, through central New York, along the Kentucky-Virginia border, and then to Oklahoma. East of the front, warm moist air was streaming northeastward. West of the front, cooler drier air was advancing slowly eastward. Clouds and thunderstorms were widespread along and in advance of the front. These storms developed over Maine and western New Hampshire before takeoff. The flow in the middle and upper levels was dominated by a strong closed low near the Great Lakes and an associated deep trough that extended southward from it. A strong ridge of high pressure dominated the Rocky Mountain area, and a closed low was located offshore of Washington State. A series of short wave troughs was traveling southeastward along the front side of the ridge and toward the East Coast trough. One of these short waves helped trigger the storms along the Atlantic Coast.

The DC-8 initially climbed to 30 Kft moving along its north eastern track. There was clear evidence of pollution influences between 23-30 Kft consistent with the expected WCB lifting. However, pollution in the upper troposphere continued to persist virtually through the entire flight even in areas that should not have been greatly influenced by WCB convection. These UT air masses typically contained moderately elevated CO (120-150 ppb) and O3 (60-75 ppb) levels along with high concentrations of secondary species (HCHO - 600 ppt; H2O2- 200 ppt). There was some possibility of stratospheric influences at 35 Kft (O3-105 ppb; CO-85 ppb) but these air masses were predominantly of tropospheric origin. Descent to surface levels along this north and south easterly track found the expected surface pollution with prominent aerosol layers at around 5 Kft (SO4- 15 μg/m3). At 1502 UT we did a Terra underpass (35 to 1 Kft) off the Virginia Coast under virtually cloud free conditions. Due to military restrictions, it was not possible to descent below 25 Kft until the DC-8 was over the coast line on its westerly track. Once over the coast, we did an in progress descent and the DC-8 sampled the boundary layer extensively over a variety of pollution and vegetation types. The DC-8 intersected the cold front at low levels near the border of Virginia and Kentucky. The winds shifted from southerly to westerly during this passage, humidity began to decrease, and things got generally cleaner. West of the cold front (37.5N; 82.4W) we did an AIRS under-fly (1 to 35 Kft) at 1825 UT in the presence of approximately 25% cloud cover, mostly due to small cumulus. These conditions were deemed adequate for AIRS validation. The DC-8 climbed to 35 Kft prior to its descent into MidAmerica. This transit flight was able to accomplish all its targeted objectives.

The navigational data are available at URL: http://www.dfrc.nasa.gov/Research/AirSci/DC-8/ICATS/index.html

Intex-NASA 817 11 Aug 04



DC-8 NASA 817 INTEX 11 Aug 04

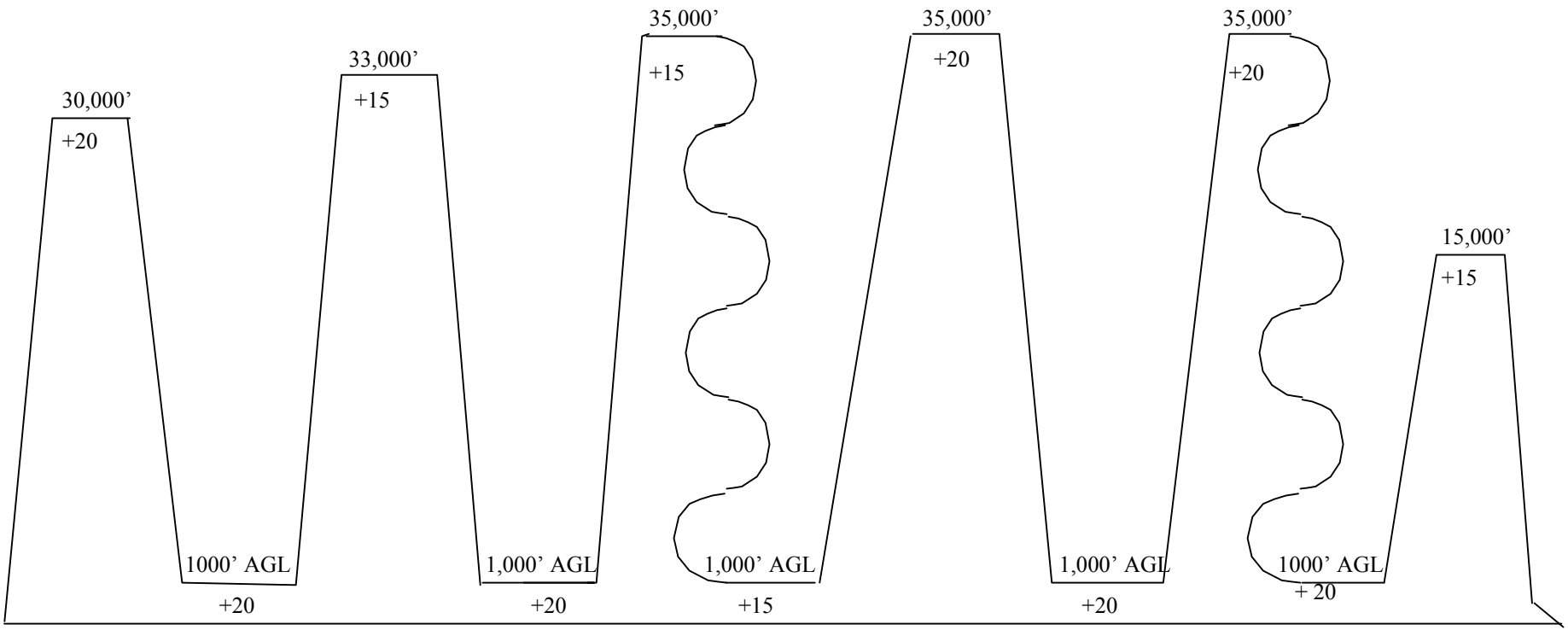
SPIRAL CLIMBS

to 10,000 msl @1,000 fpm

then 1500 fpm

ALL ENROUTE CLIMBS/DESCENTS

1500 FPM



PSM YSJ 42N 66W 40N 65W 3530N 65 W ZIBUT LVL ECB160053 BLV

TYPE ACFT	CALL SIGN	DATE	FROM	TO	PLND TO	ACT TO	PILOT	COPILOT
DC-8	NASA817		PEASE INTL TR N 43 05.5 W070 50.0	SCOTT AFB MID N 38 32.7 W089 50.1	11:56			

TOT DIST	TOT TIME	FUEL REQ	NAVIGATOR	ENGINEER
2232.1	07+56	81970		

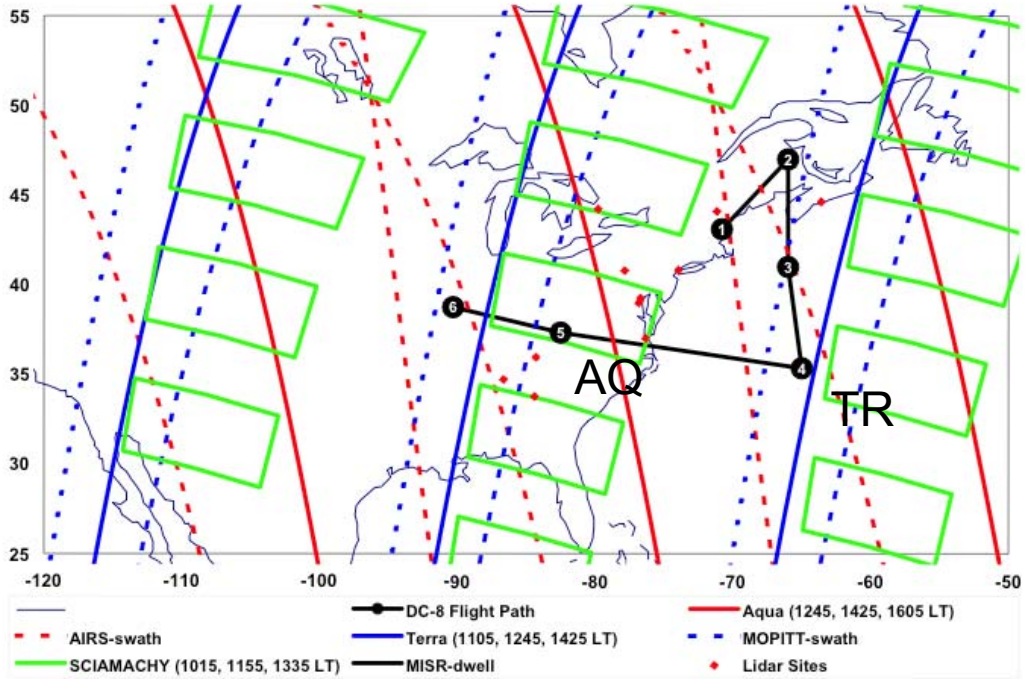
TP DTD#	Fix/Point Description	FREQ	Latitude Longitude	Alt Wind	TAS GS	TC MC	LEG DIST DIST REM	LEG TIME TIME REM	ETA	RETA	ATA	REMARKS
1	KPSM 16/RW PEASE INTL TR		N 43 05.5 W070 50.0	94M		149 165	0.0 2232	00+00 07+56	11:56			
2 ENE	ENE KENNEBUNK	118X 117.10	N 43 25.5 W070 36.8	8188M	N/A N/A	026 042	22.3 2210	00+04 07+52	12:00			
3 BGR	BGR/R BANGOR	095X 114.80	N 44 50.5 W068 52.4	20000M	330 330	042 059	113.4 2096	00+21 07+31	12:21			
4 DANOL	DANOL/W DANOL		N 45 41.9 W067 47.3	20000M	330 330	042 060	69.0 2027	00+13 07+19	12:33			
5 47N66	YFC/R035069 FREDERICTON	077X 113.00	N 47 00.0 W066 00.0	20000M	330 330	044 063	107.8 1920	00+20 06+59	12:53			
6 YSJ	YSJ/E SAINT JOHN	082X 113.50	N 45 24.4 W065 52.2	20000M	330 330	177 196	95.7 1824	00+17 06+42	13:10			
7	YQI/E YARMOUTH	080X 113.30	N 43 49.5 W066 04.9	20000M	330 330	185 204	95.4 1729	00+17 06+24	13:28			
8 42N66	.JINK PT		N 42 00.0 W066 00.0	20000M	330 330	178 196	109.5 1619	00+20 06+04	13:48			
9 40N65	.40N65W none		N 40 00.0 W065 00.0	20000M	330 330	159 177	128.2 1491	00+23 05+41	14:11			
10 SPI 1	.SPIRAL PT 1		N 35 30.0 W065 00.0	20000M	330 330	180 197	269.7 1221	00+49 04+52	15:00			
	.delay		N 35 30.0 W065 00.0	20000M	330 330	180 196	0.0 1221	00+35 04+17	15:35			
11 ZIBUT	ZIBUT/W ZIBUT		N 36 56.3 W072 40.0	20000M	330 330	283 298	381.9 839	01+09 03+08	16:44			
12 BAATT	BAATT/W BAATT		N 36 53.9 W075 59.6	20000M	330 330	269 281	160.1 679	00+29 02+38	17:14			
13 LVL	LVL/R LAWRENCEVILLE	076X 112.90	N 36 49.1 W077 54.2	20000M	330 330	267 277	92.1 587	00+17 02+22	17:30			

TP	Fix/Point	FREQ	Latitude	Alt	TAS	TC	LEG DIST	LEG TIME	ETA	RETA	ATA	REMARKS

DTD#	Description		Longitude	Wind	GS	MC	DIST REM	TIME REM				
14	SBV/R176005	041X	N 36 36.0	20000M	330	256	54.5	00+10	17:40			
SBV	SOUTH BOSTON	110.40	W079 00.0		330	265	532	02+12				
15	PSK/R	115X	N 37 05.3	20000M	330	290	87.5	00+16	17:56			
PSK	PULASKI	116.80	W080 42.8		330	298	445	01+56				
16	ECB/R160053	041X	N 37 20.0	20000M	330	280	86.9	00+16	18:12			
	NEWCOMBE	110.40	W082 30.0		330	287	358	01+40				
	.delay	041X	N 37 20.0	20000M	330	280	0.0	00+35	18:47			
		110.40	W082 30.0		330	286	358	01+05				
17	PXV/R	080X	N 37 55.7	20000M	330	278	253.3	00+46	19:33			
	POCKET CITY	113.30	W087 45.7		330	282	105	+19				
18	KBLV/A		N 38 32.7	20000M	330	291	104.7	00+19	19:52			
	SCOTT AFB MID		W089 50.1		330	292	0	+00				

INTEX-18 Transit flight plan- August 11, 2004

Take off- 8 am
Flight length- 8.5 h



- **Terra underpass (PT 4; 1100UT)**
- **Aqua underpass (PT 5; 1425 UT)**
- **NA outflow & WCB lifting (PT 1-4)**
- **Frontal crossing and low level pollution**